

WHAT IS CLAIMED IS:

1. A method for demodulating and decoding a hierarchically modulated signal (202) having a first modulation at a first hierarchical level and a second modulation at a second hierarchical level, comprising the steps of:
 - 5 demodulating and processing (502) the hierarchically modulated signal (202) to produce symbols (212) from the first modulation at the first hierarchical level; applying information (504) from a plurality of the symbols from the first modulation at the first hierarchical level (212) in subtracting (214) from the demodulated hierarchically modulated signal to obtain the second modulation at the
 - 10 second hierarchical level; and processing (506) the second modulation at the second hierarchical level to produce second symbols (222) from the demodulated second signal; wherein the hierarchically modulated signal comprises a non-uniform 8PSK signal.
- 15 2. The method of claim 1, wherein applying information from the plurality of the symbols from the first modulation at the first hierarchical level comprises applying the symbols from the first modulation at the first hierarchical level after error correction (304).
3. The method of claim 2, wherein applying information from the
- 20 plurality of the symbols includes performing an FEC-corrected demodulation (402) on the hierarchically modulated signal (202).
4. The method of claim 2, wherein the error correction comprises a forward error correction (FEC) process (210).

5. The method of claim 1, wherein processing the hierarchically modulated signal (202) to produce symbols from the first modulation at the first hierarchical level (212) includes a decision-directed carrier recovery process.

6. The method of claim 1, wherein the plurality of the symbols from the first modulation at the first hierarchical level (304) are re-encoded (302) before being subtracted (214) from the demodulated hierarchically modulated signal (206, 404).

7. The method of claim 1, wherein the hierarchically modulated signal (202) is coherent and processing the second modulation at the second hierarchical level to produce second symbols (222) includes decoding (218) the second modulated signal.

8. The method of claim 7, wherein the hierarchically modulated signal (202) is non-coherent and processing the second modulation at the second hierarchical level to produce second symbols (222) further includes demodulating (216) the second modulated signal.

9. A receiver system for performing any of the methods of claims 1 - 8, comprising:

a first demodulator (204) for demodulating the first modulation of the hierarchically modulated signal (202);

a symbol decoder (208), communicatively coupled to the first demodulator, for producing symbols from the demodulated first signal;

an error decoder (210), communicatively coupled to the symbol decoder (208), for producing an error corrected symbol stream (304) from the symbols from the demodulated first signal;

a re-encoder (302) for re-encoding the error corrected symbol stream (304);

a subtractor (214), communicatively coupled to the re-encoder (302) and the first demodulator (204), for subtracting the re-encoded symbol stream from the first signal to produce a second signal; and

a second symbol decoder (218), communicatively coupled to the subtractor (214) for producing second symbols from the second signal.

10. The receiver system of claim 9, further comprising a second level demodulator (216), communicatively coupled between the subtractor (214) and the second symbol decoder (218) for demodulating the second signal from the subtractor (214) and providing the demodulated second signal to the second symbol decoder (218);

wherein the hierarchically modulated signal is non-coherent.

11. The receiver system of claim 9, wherein the hierarchically modulated signal (202) is coherent.

12. The receiver system of claim 9, wherein the error decoder (210) comprises a forward error correction (FEC) decoder.

13. A receiver system for performing any of the methods of claims 1 - 8, comprising:

a first demodulator (204) for demodulating the first modulation of the hierarchically modulated signal;

a symbol decoder (208), communicatively coupled to the first demodulator, for producing symbols from the demodulated first signal;

an error decoder (210), communicatively coupled to the symbol decoder (208), for producing an error corrected symbol stream (304) from the symbols from the demodulated first signal;

a re-encoder (302) for re-encoding the error corrected symbol stream (304);

an error correcting demodulator (402), communicatively coupled to the re-encoder (302) for demodulating the hierarchical signal (202) using the error corrected and re-encoded symbols from the demodulated first signal.

5 a subtractor (214), communicatively coupled to the re-encoder (302) and the an error correcting demodulator (402), for subtracting the re-encoded symbol stream (404) from the error correcting demodulated hierarchical signal to produce a second signal; and

a second symbol decoder (218), communicatively coupled to the subtractor (214) for producing second symbols from the second signal.

10 14. The receiver system of claim 13, further comprising a second level demodulator (216), communicatively coupled between the subtractor (214) and the second symbol decoder (218) for demodulating the second signal from the subtractor (214) and providing the demodulated second signal to the second symbol decoder (218);

15 wherein the hierarchically modulated signal is non-coherent.

15. The receiver system of claim 13, wherein the hierarchically modulated signal (202) is coherent.

16. The receiver system of claim 13, wherein the error decoder (210) comprises a forward error correction (FEC) decoder.